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Government of Bengal

Public Health Department

14939

Twenty-ninth Annual Report of the Chief Engineer Public Health, Bengal

For the year ending December 1941

G-3(14)
1943
14939

Superintendent, Government Printing
Bengal Government Press, Alipore, Bengal
1943

Price—Indian, annas 8; English, 10d.

G 3(14)

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Twenty-ninth Annual Report of the Chief Engineer, Public Health, Bengal, 1941.

1. **Establishment.**—I was in charge of the department throughout the year.

Mr. W. J. Berry, M.B.E., F.S.I., A.M.INST.C.E., M.I.E. (Ind.), M.R.SAN.I., Mr. M. Hossain, A.M.I.E. (Ind.), and Rai S. N. Roy Bahadur, B.E., A.M.I.E. (Ind.), Executive Engineers, held charge of the Central. Western and Dacca Divisions, respectively, throughout the year.

The newly created A.R.P. Division was in charge of Mr. S. C. Ghose, A.M.I.MECH.E., M.R.SAN.I., A.M.I.E. (Ind.), formerly Assistant Engineer (Mechanical).

Two posts of permanent Assistant Engineers and 13 subordinate engineering posts have been sanctioned by Government with effect from 1st April 1941.

The strength of the engineering establishment of the department at the close of the year was as follows:—

	Permanent.	Temporary.	Total.
Assistant Engineers ..	5	4	9
Supervisors	4	3	7
Overseers	4	14	18
Sub-Overseers	5	0	5
Superintendent, Water Works ..	1	1	2

2. **Schemes prepared.**—The following schemes were drawn up during the year under review:—

Sketch Projects.

(a) Water-Supply.

		Estimated cost
		Rs.
(*i*) Darjeeling water suply ..		59,500
(*ii*) Bhatpara water-supply Re-Modelling Scheme ..		9,00,000
(*iii*) North Barrackpur (Sadar Bazar) water-supply ..		51,700
(*iv*) Patuakhali water-supply Improvement Scheme ..		6,700
(*v*) Perojpur water-supply Improvement Scheme ..		20,000
(*vi*) Bankura Water-supply Extension Scheme ..		77,400
(*vii*) Bally Water-supply Scheme		5,36,700
(*viii*) Raneegunge Water-supply Improvement Scheme		9,054
(*ix*) Improvement to the Water-supply system for the Police Lines at Bankura		26,800
(*x*) Chittagong Water works Remodelling Scheme (Revised)—		
(*i*) Water-supply remodelling scheme	5,59,000	
(*ii*) Improvedent of drainage	57,000 ..	6,16,000

	Estimated cost.
	Rs.
(2) To help A. R. P. measures by providing an additional supply of water, to make up shortage in the town supply likely to be caused by the heavy demand on it for fire fighting purposes, it was decided to excute a portion of the remodelling scheme immediately.	
The partial scheme was estimated to cost	63,000
(*xi*) Begumganj Water-supply Scheme	1,80,000

(*b*) *Drainage and Sewerage.*

(*xii*) Kamarhati Drainage Scheme	1,65,000
A surface drainage scheme was also prepared for the Ariadah, Dakshineswar and Belghoria Wards; the estimated cost of the works amounting to ..	3,34,500
(*xiii*) Serampore Drainage Scheme and Chatra Outfall Drain	20,900
(*xiv*) Katwa Drainage Scheme	3,700
(*xv*) Improvement of Bagerkhal Outfall drain of Rishra-Konnagar Municipality	3,200
(*xvi*) Bhadreswar Drainage Scheme	12,000
(*xvii*) Pucca drain for Ward No. 3 of the Ranaghat Municipality	1,000
(*xviii*) Begumganj Drainage Scheme	1,80,000

Detailed Projects.

(*a*) *Water-supply.*

(1) Water-supply for the new subdivisional headquarters of Madaripur (at Sakuni)	42,400
(2) English Bazar Water-supply Improvement	12,500

(*b*) *Drainage and Sewerage.*

(3) Sanitation Scheme for the Pabna Police Lines	16,300
(4) Disposal of night soil. Chandpur Municipality, Southern Section ..	4,500

Miscellaneous.

Estimates were prepared for the following :—

(1) Installation of fire hydrant at Kalimpong		10,700
(2) Sanitation of Pabna Jail—		
(*a*) Disposal of night soil and sullage		3,200
(*b*) Disposal of storm water		7,700
(3) Scheme for an emergency water-supply at Bhola		6,100
(4) Iron eliminators at Meghna Mill for Bhatpara water-supply		31,000
(5) Laying mains to supply certain plots in the development area at Kalimpong		1,660
(6) Extension of water-supply main at Kamarhati		676
(7) Revised estimate for septic tank latrines in the Forest Compound at Kalimpong		5,800
(8) Design for a measuring weir for testing the yield of the Akra tube-well at Garden Reach		425
(9) Eden H. E. School, College and Hostel for Girls at Ramna, Dacca.		
The estimated cost was as follows :—		
(*i*) Water-supply scheme	15,645	
(*ii*) Sewerage scheme	41,300	
(*iii*) Duplication of rising main	6,500	
		63,445

3. The total estimated costs of schemes prepared were as follows:—

	Rs.
(1) Sketch Projects—	
(*a*) Water-supply	25,46,854
(*b*) Drainage and sewerage	7,20,300
(2) Detailed Projects—	
(*a*) Water-supply	54,900
(*b*) Drainage and sewerage	20,800
(3) Miscellaneous	1,30,706

4. **Schemes examined.**—(1) Designs for two septic tank installations for the Executive Engineer, Department of Communications and Works, Bakarganj.

(2) Designs for septic tank installation for the Commissioners of the Port of Calcutta.

(3) Designs for installation of sanitary fittings in houses in Kalimpong Bazar.

(4) Estimate prepared by the Communications and Works Department for making the invert of the kutcha drains through the Military Camp and the Jail starting from the Engineering School down to Sir Nazimuddin Road, Dacca, pucca as an antimalarial measure.

5. **Works executed under the supervision and control of the department.**—(1) *Bhatpara Improvement Scheme.*—The surface drainage portion of the scheme was completed during the year.

As the land acquisition proceedings had not progressed sufficiently to permit of the land being demarcated before the monsoon, little progress could be made with the Pakhimara Bhil. Drainage Scheme. The pumping plant was however imported and stored.

Progress with the remodelling of the water-supply to the decentralised storage system was slow owing to agitation over some of the sites selected for the street tanks, difficulties with the contractor owing to the rise in prices and the growing scarcity of labour.

(2) *Rajshahi water-supply.*—The second iron eliminator was completed and put into commission and two additional softening units were installed and set to work. The whole of the re-generating plant was remodelled so that the whole of the brine can be handled from one end of the building without any salt having to be brought into the engine room, thus putting an end to the corrosion resulting from salt being carried about on the operator's feet.

The output of the borehole type turbine pumps fitted in the two tube-wells, which formerly decreased from 11,000 to 9,500 G.P.H. during the hot season owing to the large drop in subsoil water-level, has been brought up to a constant figure of 11,000G.P.H. throughout the year by the fitting of two additional stages on each pump, the components for which were imported.

The third H. L. pumping set was also installed and put into commission thus completing the whole of the extensions at the head-works. No progress could be made on the extension of the distribution system, as, owing to war conditions, it was not possible to obtain deliveries of the 5″ and 6″ pipes for extending the mains. Most of the other sizes of pipes and all the specials had however arrived at site.

(3) *Garden Reach water-supply.*—The laying of the distribution mains was practically completed except for some small zone centres for supplying the mills and workshops, and these were delayed because of the difficulty in obtaining castings.

The high lift pumping plant arrived safely but could not be put into commission for the same reason.

A contract for a boring 800 feet deep at Badartolla was let out in December.

(4) *Kalimpong Fire Hydrant Scheme.*—Most of the materials were ordered and some had arrived at site at the close of the year.

(5) *Dacca Waterworks Improvement IV.*—A rising main from the Narinda tube-well to Victoria Park reservoir was laid at a cost of Rs. 15,817.

(6) *Dacca Waterworks Improvement IV-D—Part I.*—Several contracts were let out and collection of materials were in progress. The steel materials for the reinforced concrete elevated reservoir at Islampur were brought to site but the construction could not be proceeded with owing to difficulty in obtaining land and the subsequent land acquisition proceedings.

(7) *Narayanganj West Bank Water-supply Improvement Scheme—Part II.*—The work of providing a separate wash main to the filters was completed.

(8) *South Chandpur new waterworks.*—Most of the works included in the scheme were completed and the waterworks were brought into operation in April.

(9) *Munshiganj Water-supply Scheme.*—Tenders for the supply and erection of filter and pumping machinery and for construction of the coagulation tank were invited.

6. **Expenditure on new works.**—The total capital expenditure on waterworks and sewerage works in the province during the year under review amounted to Rs. 3,45,959 and Rs. 81,176, respectively, *vide* appendices I and II, as against Rs. 2,33,943 and Rs. 1,17,961, respectively, in the previous year.

7. **Maintenance of waterworks.**—(1) *Kalimpong water-supply.*—Owing to a period of very heavy rainfall certain slips took place carrying away a section of the 6″ main and damaging the 10¼ miles long conduit in various places. This resulted in the usual repair estimate being increased from Rs. 4,500 to Rs. 6,100.

The accelerated rate of development in the new station increased the demand for water, also the work of reading meters and collecting excess water consumption charges.

At the end of the year a scheme was under preparation for the remodelling the distribution reticulation in Part I of the Development Area.

(2) *Baranagar-Kamarhati joint water-supply.*—The waterworks was maintained by the department for the second year and handed over to the Joint Committee as a going concern on the 26th April.

(3) *Emergency water-supply at Bhola (Bakarganj).*—To relieve the distress occasioned by the cyclone which swept Bhola island, a pumping plant belonging to this department with necessary staff was despatched to the island and an emergency water-supply was given by pumping from the deep tube-well, installed last year, as the scheme for the permanent water-supply had not yet materialised.

This proved of great benefit and people came in from villages 4 to 5 miles away to collect fresh drinking water, most of the water-supply sources in the island having been ruined by salt water.

(4) *Maijdi drainage and waterworks.*—The quality of water supplied from the waterworks as indicated by the analysis reports was uniformly good.

Owing to engine troubles, it was not possible to pump night-soil through the sewers. All sullage was however disposed of satisfactorily and according to the arrangement laid down in the sanctioned design.

8. **Management of sewerage and waterworks.**—As required by the rules regulating the management of sewerage and waterworks the following routine duties were carried on:—

(1) Checking of monthly returns.

(2) Scrutiny of the annual budget estimates.

(3) Examination of the periodical inspection reports on the machinery and filters.

(4) Scrutiny of monthly reports on analysis of water.

(5) Scrutiny of the quarterly returns of house connections, and the annual abstracts of accounts of depreciation funds.

9. **Quality of drinking water.**—The quality of drinking water supplied from the various waterworks was satisfactory.

10. **Inspection of water-works and sewerage works.**—The Executive Engineers inspected the various municipal waterworks and drainage works periodically as usual. Their reports were forwarded to the local bodies concerned with the necessary instructions.

The Assistant Engineer (Mechanical) and the Supervisor (Mechanical) also carried out their periodical inspections.

11. **Waterworks in operation.**—There were 52 waterworks in operation in the province during the year which supplied 19,514,444 gallons filtered water to a total population of 1,639,206.

12. **Inspection of Waterworks and Sewerage Machinery.**—The majority of the sewerage and waterworks machinery were inspected by Messrs. Volkart Bros. The machinery of Bhatpara and Tittaghur sewerage works were inspected by Messrs. W. J. Nicoll and J. Kinnear respectively. Those of Bankura and Raneegunge waterworks were inspected by Dr. J. N. Basu and Messrs. Burn & Co., respectively. These reports were scrutinized and forwarded to the respective local authorities with necessary advice.

13. **Practical training of student engineers and student overseers.**—The two student engineers of the Bengal Engineering College who joined this department in the previous year for practical training completed their training and two new student engineers of the same college were taken in.

Three student overseers of the Ahsanullah School of Engineering, Dacca, who joined this department in the previous year for practical training completed their training and two new student overseers of the same school were taken in.

14. **Miscellaneous inspections made and works done.**—(1) The Executive Engineer, Central Division, was deputed to enquire into and report on the "minimal dosing" system of chlorination which had been adopted at the Trichinipoly waterworks after prolonged experiment. He made his inspection in December and his report was under preparation at the close of the year.

(2) Suggestion was given to the District Magistrate, Dacca, to make pucca the invert of the kutcha drains through the Military Camp and the

Jail, starting from the engineering school down to Sir Nazimuddin Road, as an anti-malarial measure.

(3) At the request of the Superintendent, Albert Victor Leper Hospital, Gobra, the scheme for a tube-well for the Hospital was examined and the necessary estimate supplied.

(4) At the request of the Executive Engineer, Burdwan Division, the proposal for re-sinking the two tube-wells in the compound of the Government buildings at Katwa was examined and necessary improvements suggested.

(5) Under instructions from Government the suggestion for the installation of an iron eliminator on the proposed tube-well in the Circle Inspector's quarters in the Inspection Bungalow at Munshiganj was examined and the necessary advice given.

(6) At the request of the Inspector-General of Prisons, the proposal for the installation of an iron eliminator on the tube-well in the compound of Manickganj Sub-Jail was examined and the necessary advice given.

(7) At the instance of the Executive Engineer, Hijli Division, the proposal for the installation of a small iron eliminator on the tube-well sunk in the Munsiff's residence at Garbetta was examined. A fresh design of an iron elimination plant suitable for that tube-well was sent to him.

(8) At the request of the Inspector-General of Prisons, the tube-well re-sunk by the Jail Department in the jail garden at Rajshahi was inspected by the Executive Engineer, Central Division, and suitable recommendations submitted.

(9) Under instructions from Government the proposal for re-excavation of the tank in the compound of Banaripara police-station in the district of Bakarganj and for putting the tube-well into working order was again examined. It was decided that, as recommended previously, it would be much better to sink a trial boring in the first instance, as far from the river as possible and that if adequate water of suitable quality was obtained, a tube-well should be inserted before withdrawing the casing. The necessary report was submitted.

15. **Rural water-supply.**—With the inauguration of the comprehensive scheme for rural water-supply in the province, examination of the programmes of rural water-supply and estimates prepared by the District Water-supply Committees devolved on this department. This was a task of considerable magnitude which kept the small staff of the Rural Water-supply Subdivision of the department fully engaged throughout the year. A scrutiny of these programmes revealed that they had not been drawn up in conformity with the principles laid down by Government, and there was a tendency in almost all cases to take a larger share of the Government grant with unjustifiably larger number of sources of supply. The programmes were therefore recast in this department and the detailed estimates revised at the then current market prices of materials. The total estimated cost of the scheme amounted to Rs. 52,361,940.

Government having decided to place the entire rural water-supply grant for the year at my disposal, programmes of work to be done during the year were drawn up for the districts, and the district authorities were asked to select sites for tube-wells and other water-supply works. The estimated cost of works to be done during the year amounted to Rs. 5 lakhs. From the grant placed in my hand allotments were made to the District Officers to meet the cost of labour required for sinking the tube-wells, and arrangement for despatch of materials for tube-wells was made. Owing to late arrival of the materials due to restrictions on booking by railways, the major portion

of the money allotted to District Officers could not be utilised within the year. This gave rise to the necessity for restoration of the lapsed grants in many cases.

The Assistant Engineer and the Supervisors of the Rural Water-supply Subdivision made extensive tours all over the province in connection with the examination of the district programmes of rural water-supply. While on their tours they took the opportunity to advise local bodies and their technical staff on matters relating to water-supply, they also inspected the existing tube-wells and supervised new water-supply works in progress in rural areas as far as practicable.

16. **A.R.P. tube-wells in Calcutta.**—A scheme for sinking 2,500 tube-wells in Calcutta to provide alternative sources of drinking water-supply for the people residing within the Calcutta Corporation limits in the event of a breakdown of the existing water-supply system as a result of enemy action was sanctioned by Government. The scheme was estimated to cost Rs. 16 lakhs and the amount was placed at my disposal.

Provision was made for the sinking 2,000 deep tube-wells of $1\frac{1}{2}''$ diameter to an average depth of 250 feet each in the sewered areas, and 500 tube-wells of $1\frac{1}{4}''$ diameter to an average depth of 70 feet in the unsewered areas. After tenders had been accepted and the actual work commenced within the unsewered areas, it was found that the tube-wells specified for a depth of 70 feet were not suitable as no potable water could be obtained at that depth. So, in order to obtain potable water in the unsewered areas as well, tube-wells of 250 feet average depth were sunk throughout.

Preference was given to bustee areas, schools, institutions, fire stations and places of religious importance, such as mosques, temples and churches. Special care was taken to select the sites so as to provide ample accommodation for the crowds that would assemble at the time of emergency without causing obstruction to traffic in any way.

During the period of emergency the aforesaid 2,500 tube-wells together with the 1,100 tube-wells already existing in the city were calculated to supply water at the rate of 6 gallons per head per day.

The work was started in June 1941 and it was expected that the whole scheme would be completed by December, but all the materials required were not readily available. A contract had to be made for forward delivery of American pipes to make up the shortage. On account of the international situation the forward delivery which was due within three months from the date of order could not be had till the middle of December 1941. Thus it was not possible to complete the work by December 1941. By the end of the year under review 1,521 wells were completed and samples of water from 425 tube-wells were examined and found satisfactory. The bacteriological and chemical analysis of water from these tube-wells were carried out by the Chief Analyst to the Corporation of Calcutta, necessary funds having been provided by Government.

The sites were suggested by the Calcutta Corporation and the final selection was made by this department in consultation with the Calcutta Electric Supply Corporation and other authorities likely to be affected.

The maintenance of the completed wells proved to be a difficult task owing to theft of pumps, pump parts, well tubes, bolts and nuts, etc. Reckless driving of motor vehicles caused many parts of the tube-wells to be knocked out. Small boys found it a pleasure to convert the wells into play-things and to choke the pumps by putting in marble balls, pebbles, road ballasts, etc., through the spout. Some mischievous persons have also

been responsible for putting a good many of these tube-wells out of commission by rough handling. Efforts have made to stop these as far as practicable.

17. **A.R.P. Schemes.**—(*i*) *Water-supply for fire-fighting in Calcutta.*—An estimate amounting to Rs. 30,600 for six 5″ diameter tube-wells was prepared. Supplementary estimates and drawings for chambers and bends for these tube-wells were also prepared. Sinking of the tube-wells was completed and order placed for bends.

(*ii*) *Improvement of water-supply at Chittagong.*—A detailed estimate amounting to Rs. 63,000 for a 6″ diamater tube-well with appurtenances, which formed part of the Chittagong Waterworks remodelling scheme, was prepared in order that this portion of the scheme might be carried out as an A.R.P. measure.

(*iii*) *Chittagong Hospital water-supply.*—Contract drawings and bills of quantities for the pump house were drawn up.

An estimate amounting to Rs. 11,100 for a revised arrangement of the scheme was prepared.

(*iv*) An estimate prepared by the Department of Communications and Works for a tube-well at the Lal Bazar Police Headquarters was examined.

(*v*) Estimates were prepared for the following:—

	Rs.
(1) Scheme for providing fire hydrants for Garden Reach Municipality ..	11,500
(2) Scheme for providing fire hydrants for Bhatpara Municipality	20,600
(3) Scheme for providing fire hydrants for Naihati Municipality	8,200
(4) Improvement of water mains at Naihati for A. R. P. purposes	4,100

18. **Civil Defence schemes.**—(*a*) Civil Defence schemes of the following municipalities so far as the protection of water-supply, sewers, roads and conservancy service are concerned, were examined:—

(1) Rishra-Konnagar, (2) Serampore, (3) Baidyabati, (4) Tollygunge, (5) Budge Budge, (6) Barrackpore (protection of roads only), (7) Champdani, (8) Bansberia, (9) Kamarhati, (10) Khardah, (11) Tittaghur (road and water-supply), (12) Bhadreswar and (13) Hooghly-Chinsura.

(*b*) Civil Defence schemes for the following municipalities were prepared and sent to the Chairmen concerned.

(1) Tittaghur, (2) Panihati, (3) South Dum Dum, (4) North Barrackpore and (5) Halisahar.

(*c*) The A.R.P. Division was created by the end of August 1941 for helping the municipalities in the vulnerable areas of the districts of 24-Parganas, Howrah and Hooghly as well as the Corporation of Calcutta with expert advice regarding preparation of Civil Defence schemes for protection of water-supply pumping stations and water mains, roads and sewers, provision of alternative sources of water-supply and maintenance of the conservancy service, and for co-ordinating the Civil Defence measures of these municipalities. The activities of the Division gradually expanded far beyond these limits. The Division supervises the Civil Defence works of all municipal bodies in the province including the Corporation of Calcutta at all stages of their execution. It prepares and executes water-supply works for the hospitals in Calcutta, Howrah, Asansol, Chittagong, Budge Budge, Uttarpara and Kamarhati as well as the A.R.P. Depots

and fire-fighting stations in Calcutta and Howrah including some big tube-wells in Calcutta for fire fighting purposes which are meant to serve as alternative sources of supply in case Calcutta Corporation's unfiltered supply fails. It scrutinizes all A.R.P. and Civil Defence schemes sent by Government.

19. **Expenditure incurred by the department for Miscellaneous Works during the year was as follows:—**

	Rs.
(1) Baranagar house connection scheme	747
(2) Kamarhati house connection scheme	353
(3) Emergency water-supply in the district of Bakarganj	6,386
(4) Emergency water-supply in the district of Noakhali	53,090
(5) Installations of fire hydrants, etc., in Kalimpong Bazar	1,812
(6) Sinking of 5″ diameter tube-wells to serve underground reservoirs already constructed in Calcutta for A. R. P. works	25,893
(7) Working of tube-wells at Bhola with departmental pumping plants ..	736
(8) Tools and plant for 1941-42	1,091
Total ..	90,108

In addition to the above, an expenditure of Rs. 8,98,928 was incurred during the year for sinking tube-wells in Calcutta as alternative sources of water-supply in the event of failure of the existing supply due to enemy action.

20. **Fees realised.**—The total amount of receipts of the department during the year under report was Rs. 12,779 as detailed below:—

	Rs.
(1) Fees for preparation of schemes	906
(2) Fees for supervision of construction	11,003
(3) Miscellaneous	870
Total ..	12,779

S. N. GHOSE,

Chief Engineer, Public Health, Bengal.

CALCUTTA,

The 22nd July 1942.

APPENDIX

Statistics with regard to Municipal

No.	Name of municipality.	Year of comple-tion	Area served.	Designed capacity of works.	Approxi-mate population served.	Average daily supply in gallons.	Average daily supply per head of popula-tion. in gallons.	Total capital expendi-ture during 1941.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
1	Burdwan ..	1884 1st extension in 1926.	3·30	703,080 gallons daily.	39,201	456,272	11·64	1,970
2	Mymensingh ..	1893 1st and 2nd extensions in 1922 and 1937 respectively.	2·50	400,000 gallons per day in 8 hours.	51,000	511,131	10·02	..
3	Howrah ..	1896	10·10	..	224,873	4,194,507	18·65	11,684

I.

Waterworks in Bengal, 1941.

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
5,93,044	20,454	1·96	River Damodar	Five slow sand filter beds.	Two Tangye's horizontal crude oil cold starting engines, rated 77B. H. P.; 28″ single stage low lift type Tangye's centrifugal pumps direct belt driven, capacity of each 52,000 gallons per hour, average total lift 39′. Two Tangye's triplex single acting horizontal plunger pumps. The shaft is coupled direct to the engine by friction clutch and the pumps are driven through a single reduction, helical gearing. Capacity of each pump 47,000 gallons per hour. Average total lift 96·34′. One Tangye's "AA" type oil engine 2¾ B. H. P. single cylinder for workshops. One Lancashire boiler and one horizontal compound Worthington condensing pumping engine.
6,44,568	22,470	1·92	River Brahmaputra.	Five slow sand filter beds and two Patersons' rapid gravity type filters. Normal capacity of each filter per hour 12,500 gallons.	Riverside pumping station— (*i*) Two numbers Harland 7″ spiroglide vertical single stage split casing centrifugal pumps driven by 2 Nos. 10B. H. P. Harland E type drip proof vertical spindle continuously rated compound wound interpolar 440 volt × 37·4 amp. 1,000/1,450 R. P. M. D. C. motors, each set having a capacity of 51,480 G. P. H. against a total head of 55 feet at a pump speed of 1,400 R. P. M. High Lift station— (*ii*) Two number Harland 6″ spiroglide horizontal single stage centrifugal pumps driven by 2 Nos. 36 B. H. P. Harland E type drip proof continuously rated compound wound interpolar 440 volts C. 69·25 amp. 1,450-1,700 R. P. M. D. C. motor. each set having capacity of 50,000 gallons per hour against a total head of 105 feet at a pump speed of 1,650 R. P. M. Standby plant— (*iii*) One triple expansion horizontal Worthington Duplex high and low lift combined steam pumping engine, steamed off a Babcock and Wilcox water tube boiler.
44,61,544	2,09,543	2·19	River Hooghly	Ten slow sand filter beds.	For unfiltered water—Two vertical high speed uniflow engines direct coupled with two 20″ Worthington low lift centrifugal pumps. Average total head—3 feet. For filtered water—One Worthington vertical triple expansion flywhee triplex pumping engine. One Worthington horizontal triple expansion Duplex pumping engine. Two horizontal compound condensing Duplex pumping engines by Evans and Deans. Average total head 92′. Five Lancashire boilers.

No.	Name of municipality.	Year of comple-tion.	Area served.	Designed capacity of works.	Approxi-mate population served.	Average daily supply in gallons.	Average daily supply per head of popula-tion. in gallons.	Total capital expendi-ture during 1941.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
4	Berhampore ..	1899	6·00	612,000 gallons daily.	40,804	360,935	8·84	7,700
5	South Suburban ..	1904	3·70	..	25,200	69,708	2·76	496
6	Garulia ..	1904	1·50	..	14 000	256,000	18·28	1,283
7	Tittagarh ..	1905	1·50	..	57,233	1,745,966	30·50	..
8	Narainganj (West Bank of the river).	1908 1st and 2nd exten-sion in 1935 and 1937 respec-tively.	3·00	445,000 gallons daily in 18 hours (capaci-ty limi-ted by storage in elevated tanks.)	24,487	512,989	20·95	9,449
9	Tollygunge ..	1909	5·15	..	32,000	206,675	6·45	5,967
10	Champdany	1909	1 65	..	25,365	394,206	15·54	2,179
11	Dacca	1910 1st, 2nd, 3rd and 4th ex-tensions in 1921, 1929, 1935, and 1937 res-pectively.	7·00	2,400,000 gallons per day in 24 hours (capacity limited by pump delivery).	213,218	2,465,250	11·56	91,718

Resolution on the Reports of the Chief Engineer, Public Health, and of the Sanitary Board, Bengal, for the year 1941.

GOVERNMENT OF BENGAL.

Department of Public Health and Local Self-Government.

Public Health.

RESOLUTION—No. 308P.H.

Calcutta, the 15th February 1944.

Read the Reports of the Chief Engineer, Public Health, and of the Sanitary Board, Bengal, for the year 1941.

Mr. S. N. Ghosh held charge as Chief Engineer throughout the year.

The volume of work of the Engineering Branch of the Public Health, Bengal, greatly increased during the year under review owing to A.R.P. and Civil Defence work arising out of the present emergency. An A.R.P. Division was created by the end of August 1941 for helping the municipalities in the vulnerable areas of the districts of 24-Parganas, Howrah and Hooghly as well as the Corporation of Calcutta with expert advice regarding preparation of the Civil Defence schemes for protection of water-supply pumping stations and water-mains, roads and sewers, provision of alternative sources of water-supply and maintenance of the conservancy service, and for co-ordinating the Civil Defence measures of these municipalities. It consisted of the following staff:—

(1) one Executive Engineer, (2) one Assistant Engineer, (3) two overseers, (4) one clerk, (5) one typist, (6) one draftsman and (7) three peons.

Besides supervising the Civil Defence work of all municipalities in the province including the Corporation of Calcutta, the A.R.P. Division prepared water-supply schemes and executed works for the hospitals in Calcutta, Howrah, Asansol, Chittagong, Budge-Budge, Uttarpara and Xamarhati as well as the A.R.P. depots and fire fighting stations in Calcutta and Howrah including some big tube-wells in Calcutta for fire fighting purposes which are meant to serve as alternative sources of supply in case Calcutta Corporation's unfiltered supply failed on account of enemy activities.

Two temporary posts of Assistant Engineers and 13 temporary posts of subordinate Engineers were made permanent with effect from the 1st April 1941.

2. The total capital expenditure on water-works and sewerage works constructed or under construction during the year under review amounted to Rs. 3,45,959 and Rs. 81,176 respectively as against Rs. 2,33,943 and Rs. 1,17,961, during the previous year.

The total estimated cost of the schemes prepared by the Engineering Branch during the year was Rs. 34,73,560, as detailed below, compared to Rs. 57,41,153 during the previous year:

1. Sketch Projects—

		Rs.
(*a*) Water-supply	... ...	25,46,854
(*b*) Drainage and sewerage	... ...	7,20,300
		32,67,154

their appreciation of the services rendered by the Chief Engineer and officers of the Engineering Branch of the Public Health Department.

By order of the Governor,
E. W. HOLLAND, Secy.

No. 308/1(10)P.H.

Copy, with copies of the reports, forwarded to (1) all Commissioners of Divisions for information and communication to all District Officers and all Chairmen of district boards and municipalities in their respective divisions, (2) the Surgeon-General with the Government of Bengal, (3) the Inspector-General of Police, Bengal, (4) the Director of Public Health, Bengal, (5) the Chief Engineer, Public Health, and (6) the Joint Secretary, Sanitary Board, Bengal, for information.

E. W. HOLLAND, Secy.

Calcutta, the 15th February 1944.

BGP-43/4-10431G-530

Major Drainage and water-works.

There is a gradual deterioration in the receipt of the department which has come down to a figure as low as Rs. 12,779 only as against Rs. 35,628 in the previous year.

3. There were 52 water-works in operation during the year which supplied 19,514,444 gallons of filtered water to a total population of 1,639,206. The quality of water supplied was satisfactory.

4. The departmental officers periodically inspected the various municipal water-works and the reports of their inspection were duly forwarded to the local bodies with necessary instructions.

The department also rendered valuable assistance in the shape of advice and suggestions to other departments, local officers and local bodies in matters relating to works of sanitary engineering.

5. The programmes of rural water-supply and estimates prepared by the District Water Supply Committees involved a task of considerable magnitude and kept the staff of the Rural Water-supply Subdivision fully engaged throughout the year. In the majority of cases these programmes were not drawn up in conformity with the principles laid down by Government and they had to be recast and the total estimated cost after revision amounted to Rs. 52,361,940 at the then current market prices of materials.

The policy, hitherto, followed in distributing and disbursing the annual grant for water-supply in rural areas was modified in the year under review and the entire grant (after deducting as usual the amount required for payment to the district boards in reduction of interest payable on loans taken for the improvement of water-supply in accordance with the rural water-supply loan scheme) was placed at the disposal of the Chief Engineer, Public Health, to enable him to purchase the requisite materials at economic rates from approved firms and supply them to local officers as quickly as possible. The estimated cost of works to be done during the year amounted to Rs. 5 lakhs and out of the grant, allotments were made to the District Officers to meet the cost of labour required for sinking tube-wells.

Besides, the Assistant Engineer and the supervisors of the Rural Water-supply Subdivision toured throughout the province, in connection with the examination of the district programmes of rural water-supply.

6. Another work of great importance with which the department was entrusted during the year is the sinking of tube-wells in Calcutta at an estimated cost of over 16 lakhs to provide alternative sources of drinking water-supply for the people of Calcutta in the event of a breakdown of the existing water-supply system as a result of enemy action. The work though

Annual Report of the Sanitary Board, Bengal, for 1941

T. I. M. Nurannabi Chaudhuri, Esq., I.C.S., Secretary to the Government of Bengal, Department of Public Health and Local Self-Government, who took over charge of the office of the President of the Board in October 1940 continued to be the President of Board throughout the year under review.

The number of official and nominated members remained the same as in the previous year and there was no change in the personnels of the nominated members. Major-General P. S. Mills, C.I.E., I.M.S., Surgeon-General with the Government of Bengal, was the *ex-officio* Vice-President up to May 16th when he went on leave preparatory to retirement. Major-General W. C. Paton, M.A., M.C., M.B., F.R.C.S. (Edin.), who took over charge from him was the *ex-officio* Vice-President of the Board for the remainder of the year. Lt.-Col. A. C. Chatterjee, M.B., D.P.H., I.M.S., Director of Public Health, Bengal, *ex-officio* member and Joint Secretary to the Board reverted to military duty on August 19th and Dr. B. Mookherji, M.B., who took over charge from him on that date was the *ex-officio* member and Joint Secretary to the Board for the rest of the year.

2. The Board recorded its deep condolence on the death of Mr. G. S. Dutt who was for several years the Secretary to the Government of Bengal, Department of Public Health and Local Self-Government, and the President of the Sanitary Board.

3. The Board held *four* meetings during the year, all in Calcutta.

4. The following schemes were considered :—

(*a*) Sketch Projects.	Estimated cost. Rs.
(*i*) Dacca Waterworks Improvement Scheme for augmenting water-supply in the Puran Paltan and Nawabpur areas of the Dacca Municipality ...	48,000
(*ii*) Kalna Water-supply Scheme ...	52,000
(*iii*) Jhalakati Water-supply Scheme (revised) ...	76,000
(*iv*) Chittagong Waterworks Ramodelling Scheme (revised estimate) ...	5,59,000
(*v*) Debhatta Drainage Scheme ...	9,200
(*vi*) Barisal Water-supply Extension Scheme ...	1,20,000

Schemes as per items (*ii*), (*iii*) and (*iv*) were approved and recommended for administrative approval of Government.

Scheme (*i*) was returned for revision, while scheme (*v*) was referred to the Chief Engineer, Irrigation Department, for an expression of opinion. Revised financial proposals of the local authorities regarding scheme (*vi*) were approved and forwarded to Government.

(*b*) Detailed Projects.	Estimated cost. Rs.
(*i*) Tollygunge Flood Protection Scheme ...	3,88,969
(*ii*) Mymensingh Drainage Scheme (Revised) ...	2,50,000
(*iii*) Munshiganj Water-supply Scheme (Revised) ...	94,500
(*iv*) Debhatta Water-supply Scheme ...	7,406
(*v*) Garden Reach Water-supply Scheme (revised estimate) ...	4,24,000

Price—Indian, anna 1; English, 2d.

All these schemes were approved and forwarded to Government for final sanction.

5. In connection with the Tollygunge Flood Protection Scheme which was considered by the Board at a meeting in the previous year, the Board expressed the opinion that care should be taken to see that the scheme does not interfere with the general drainage scheme of the locality which may be undertaken in future.

They decided that this principle should be followed with regard to all future projects of drainage in municipal and non-municipal areas.

6. The Board considered the following resolution moved by Rai Dr. G. C. Chatterji Bahadur:—

"In view of starting of a large number of mills in the Khardah and Panihaty municipal areas within recent years, the sullage of most of the mills passing into the Hooghly through the drains on either side of Barrackpore Trunk Road and the Khardah Khal which, not being properly graded and being obstructed in many places, produces insanitary condition due to water-logging, the Board request the Public Health Department to move in the matter and influence the authorities concerned, the District Board of 24-Parganas, Khardah, Panihaty and Tittaghur Municipalities, the Roads and Buildings Department concerned and the mills and factories within the 3 municipalities to make a combined and co-ordinated effort by contributing appropriate quota for adoption of the scheme recently made by the Superintending Engineer, Irrigation Department, of the Southern Circle, Bengal."

The resolution was referred to the Chief Engineer, Irrigation Department, for opinion and also for a report as to how far the Irrigation Department scheme referred to in the resolution could be fitted into a comprehensive scheme.

7. The Board considered the inspection reports on the various municipal waterworks made by the Executive Engineers of the Engineering Branch of Public Health Department and made suitable recommendations to Government where necessary.

8. **Reclamation of the Nowee Canal.**—After discussion, the Board decided that the Irrigation Department should be requested to bring the abandoned portion of the khal under the Bengal Development Act, 1935, and that the Director of Public Health be requested to prepare a skeleton scheme and write to the local bodies concerned to stimulate the formation of local schemes to control malaria. The Board also considered a letter from Dr. Sir U. N. Brahmachari, Kt., suggesting that necessary anti-malaria measures may be taken up by Government at an early date in the Nowee Canal and the adjoining Government land and resolved that the Chief Engineer of the Irrigation Department who is examining the scheme be requested to send a report on the subject.

9. **Malaria Sub-Committee.**—The Board approved the minutes of proceedings of the 18th meeting of the Sub-Committee. The by-laws regarding cisterns and reserve tanks for control of malaria were also approved by a majority of the members.

10. **Formation of Provincial Board of Health for Bengal.**—A note by Dr. A. C. Ukil, embodying his proposals for the formation of a Provincial Board of Health for Bengal was circulated to members. Suggestions were also invited for drafting out tentative proposals for further discussion at a meeting of the Board.

11. **Nutrition Committee.**—The Board considered the proceedings of the 3rd general meeting of the Nutrition Committee. The resolutions of the Committee were unanimously approved and the report was adopted. The Board also considered the summary annual report of the Committee for 1940-41 together with the proceedings of the Committee's annual general meeting. The general opinion of the majority of the Board was that the Nutrition Committee carried out as much as possible within its limited resources though the objects with which the Committee was formed were comprehensive and they hoped that the report of the next year would show better results. The report was accordingly accepted by the Board.

12. **Report on the Malaria Survey of the environs of Calcutta by Mr. M. O. T. Iyenger.**—The Board resolved that Sir U. N. Brahmachari's proposal for reprinting the report be dropped.

13. **Removal of fishing bunds in obstructed drainage channels.**—The Board considered a letter from Rai Dr. G. C. Chatterji Bahadur on the control of fishery rights. The Rai Bahadur urged that the Irrigation Department should stop the fisheries bunds in their own channels. After some discussion the Board accepted the principles embodied in Rai Bahadur's letter. The Chief Engineer, Irrigation, however, pointed out that the leasing out would continue till a society as mentioned by Rai Bahadur in his letter is formed.

14. **Tuberculosis Sub-Committee.**—The Board considered the proceedings of the last (10th) meeting of the Sub-Committee.

Dr. Ukil's motion for adoption of the Sub-Committee's recommendations, except item 9(*a*) and the formation of a small Legislative Sub-Committee for considering the legislative aspect of Tuberculosis Regulations were discussed.

15. **Constitution of a Suburban Drainage Board or Industrial Health Board.**—The proposal by Rai Dr. G. C. Chatterji Bahadur for formation of a Suburban Drainage Board or Industrial Health Board for dealing with the drainage and other sanitary problems of the riparian suburban area (both municipal and rural) to the north of Calcutta from Baranagar to Kanchrapara was considered by the Board.

The Chief Engineer, Irrigation, also proposed for the formation of a similar Drainage Board for the southern area of Calcutta. After discussion, the usefulness of such a Board was appreciated, and is still under consideration.

16. (*a*) **Municipal Inspection Report.**—The inspection reports of the Circle Assistant Directors of Public Health on the municipalities of Kharda, Bogra, Mymensingh, Dinajpur, Burdwan, Raniganj, Barisal, Kotrung, Nawabganj, Pabna, Naihati, Bankura, Jamalpur, Pirojpur, Rajbari, Narayanganj and Noakhali were read.

The Board in recording them requested the Director of Public Health to publish the reports as early as possible after the inspection is over and to draw up an appraiser form showing details of inspection reports.

(*b*) The reports of the steps taken by the municipalities of Brahmanbaria, North Dum Dum, Suri, Kharda, Rajshahi, English Bazar, Kurseong, Bankura, Bogra and Noakhali to give effect to the recommendations made in the inspection reports of the Circle Assistant Directors of Public Health on those municipalities for their sanitary improvement received through the respective District Magistrates were also considered. The Board in recording them resolved that the local bodies should submit detailed reports item by item on the action taken on the inspection reports.

17. (*a*) **Monthly water analysis reports.**—The summarised statements of water analysis reports for the months of June 1940 to June 1941 were considered and recorded.

(*b*) The reports of the municipalities of Asansol, Pirojpur, Khulna and Patuakhali showing the steps taken to improve the quality of the reported contaminated water of the respective water supplies were also read and recorded.

18. **Major anti-malaria schemes.**—(*a*) Rai Dr. G. C. Chatterji Bahadur moved to put in record the Board's appreciation of the good work which Lt.-Col. A. C. Chatterji, I.M.S., has done with regard to public health planning in Bengal specially about tackling the vast problem of malaria and to urge the Government to see that he returns to his post as the Director of Public Health as soon as he is relieved from temporary military duty. The resolution was unanimously accepted by the Board.

(*b*) Rai Bahadur Chatterji also moved that the anti-malarial schemes devised and left by Col. Chatterji should either be pursued by his successor or the schemes be brought before the Sanitary Board for consideration. The Board resolved that the present Director of Public Health would examine the schemes and put them up before the Board with his recommendations.

T. I. M. NURANNABI CHAUDHURI,

President.

S. N. GHOSE,

B. MOOKHERJI,

Joint Secretaries.

CALCUTTA,

The 14th May 1942.

BGP-42/3-10015D-460

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs	Annas.			
4,40,809	25,592	3·10	River Bhagirathi.	Two slow sand filter beds.	Filtered water pumping station—Two horizontal single cylinder Blackstone spring injection crude oil engines, each of 34 B. H. P. at 375 R. P. M. Two Gywnnes invincible single stage centrifugal pumps; size 5 inches. Capacity each—30,000 against total head—120 feet. Unfiltered water pumping station.—In a barge. One Crossley cold starting crude oil engine, 24 B. H. P. One Tangye's centrifugal pump 30,000 against 90 ft. and one Crossley 24 B. H P. horizontal semi-diesel crude oil engine One Mather and Platt's centrifugal pump 30,000 gallons against 100 feet and one 26 B. H. P. Crossley crude oil engine and one Gwynne invincible pump (1940 at Rs. 4,700). All the pumps are direct belt driven from the engines. Average total lift 55 feet.
67,950	638	0·04	Calcutta Corporation Waterworks.	....	....
16.530	..	..	Supplied from local mills and 20 tube-wells.	....	....
17,929	..	..	Local mills.	....	....
4,83,200	24,589	2·10	River Sitalakhya.	One Jewell gravity filter.	Two Loco type boilers N. H. P. 12, duplicate sets of Worthington horizontal triple expansion, surface condensing, combined high and low lift pumping engines, average total lift 140 feet.
1,03,852	22,829	4·84	Calcutta Corporation.	....	....
53,202	2,084	0·23	Local jute mills and 5″ diameter tube-well.	....	....
19,50,261	55,476	0·98	River Buriganga and underground water from a tube-well.	Six Jewel gravity filters and two Paterson gravity filters capacity each 20,000 G. P. H.	Two sets of horizontal Worthington triple expansion, combined high and low lift pumping engines. Average total lift 74·5 ft. Two Babcock and Wilcock watertube boilers, N. H. P. 76, fitted in the superheater, Green's economiser, working pressure 160 lbs. Nalgola unfiltered water pumping station— One 7″ Sunturbo medium lift vertical spindle centrifugal pump driven by a Metropolitan Vickers 25 B. H. P. 440 volts. shunt wound vertical spindle motor, capable of delivering 900 G. P. M. against a total head of 58 feet with a pump speed of 1,450 R. P. M.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population. in gallons.	Total capital expenditure during 1941.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
12	Munshiganj ..	1911	1·00	Designed to supply 2,500 gallons per hour but can now supply 10,800 gallons per day for 9 hours owing to the suction due to the formation of a char.	4,600	11,150	2·42	..
13	Barisal	1912 1st and 2nd extensions in 1932 and 1935 respectively.	4·75	680,400 gallons daily.	35,716	190,188	5·32	..
14	Chandpur (Southern Section).	1912	0·42	24,000 gallons per day in 9 hours (can work 10 hours).	8,000	37,285	4·66	56,445

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
42,289	2,419	9·50	Dhaleswari river in dry season and Munshiganj khal in rainy season.	Two Jewell pressure filters.	Two horizontal Wortington Duplex piston pattern non-condensing pumping engines. Two vertical cross tube-boilers N. H. P. 5, average total lift 74 feet. (One boiler has since been scrapped.) One 6 B. H. P. Petter's type crude oil engine speed 725 R. P. M. driving a 2½" centrifugal pump through a belt.
3,50,111	11,775	2·71	Barisal river ..	Three slow sand filters.	One old Worthington tandem compound surface condensing, horizontal double acting combined high and low lift pumping engines. Average total lift 86·7 ft. Two loco-type boilers, kept as standby. Low Lift— Two Mather and Platt's 5" single stage split casing type centrifugal pumps, capacity of each 16,500 gallons per hour against 45 feet total head direct coupled to two Siemen's—Schuckert A. C. 3 phase 400 volts 50 cycles squirrel cage induction motors 7·5 H. P., R. P. M. 1,420. High Lift— Two Worthington split casing type 4" single stage centrifugal pumps, capacity of each 15,000 gallons per hour against 78' total head, direct coupled to two Siemens—Schuckert A. C. 3 phase 400 volts, 50 cycles, squirrel cage induction motors 12 H. P., R. P. M. 1,430.
1,39,347	3,828	4·50	River Dakatia	Two Jewell pressure filters.	L. L. Pumping set— Two Mather and Platt " Lanovare split casing centrifugal pump delivery 284 gallons per minute against a total head 19ft. R. P. M. 940. Such 5", delivery—4". Motor—Mather and Platt Drip-proof squirrel cage 3 B. H. P., R. P. M. 940, 3 phase 50 cycles, A. C. motor 400 volts. High Lift— Two Mather and Platt Medivane split casing medium lift centrifugal pump capacity 142 gallons per minute against a total head 90 ft. R. P. M. 1,430. Such 3", delivery—2". Two drip proof squirrel cage Rotor motor 7·5 B. H. P., R. P. M. 1,430 three phase 50 cycles A. C. of 400 volts. Fire Pump—One " Plurovane " 3"×2½" High Lift turbine pump capacity 125 gallons per minute against 115 ft. head. R. P. M. 2,870 driven by one drip-proof squirrel cage Rotor motor 7 B. H. P. three phase, 50 cycles A.C. current at a pressure of 400 volts. Two horizontal Worthington piston pattern non-condensing pumping engines. Two vertical cross tube-boilers N. H. P. 5, average total lift 74'—0".

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population. in gallons.	Total capital expenditure during 1941.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
15	Darjeeling ..	1912	4·85	Depends on rainfall.	23,000	702,438	30·54	45,163
16	Perojpur ..	1913	0·50	..	2,300	3,200	1·39	544
17	Kurseong ..	1913	2·00	Depends on rainfall.	7,451	150,000	20·13	..
18	Hooghly-Chunsura ..	1914 1st extension in 1933.	5·00	775,800 gallons daily-	32,634	698,207	21·39	..
19	Jessore	1914	4·00	112,000 gallons in 16 hours.	9,000	44,000	4·88	..
20	Khulna	1914 1st and 2nd extensions in 1929 and 1937 respectively.	3·75	200,000 gallons in 16 hours.	18,000	123,616	6·87	39

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
10,46,202	28,141	1·76	30 springs on Senchal spur.	Nil	For subsidiary service to St. Paul's School and three adjacent properties two 10 H. P. motors, one Rees Roturbo pump and one Haward Taylor duplicate plunger pump. Pumping plant at "Konkhola." One Rustom Hornsby horizontal 4 cycle semi-diesel crude oil engine B. H. P. 66. One Wortington verticle single acting triplex ram pump, direct belt driven.
24,521	544	7·45	Reserved tank	Two slow sand filters.	Two kite motion hand pumps.
1,28,777	4,614	1·34	Springs in the forest of Sopoydhora and Dow Hill.	Three Jewell pressure filters.	Gravity supply.
8,23,908	23,158	1·45	River Hooghly	Four slow sand filter beds:	Two Deutz 4 stroke, 6 cylinder full diesel engines, 130/150 B. H. P. 375 R. P. M. Low lift from river to settling tanks. Two Amag Hilpert single stage centrifugal pumps, capacity 1,250 gallons per minute. Total head 46·5′. High lift. Two Amag Hilpert two stage centrifugal pumps, capacity 1,000 gallons per minute. Total head 204 ft. All the pumps are belt driven.
2,09,914	4,284	4·26	Reserved tank and tube-well:	Three Paterson gravity filters.	Two Crossley vertical 4 stroke 5 B. H. P. crude oil engines direct coupled to two Worthington horizontal 2½″ centrifugal pumps for high lift capacity of each 8,000 gallons per hour against 64 ft., head, R. P. M. 1,400. One Crossley vertical 4 stroke 5 B. H. P. crude oil engine and one Tangye 4″ centrifugal pump. Average total lift 47·5 feet. All the pumps are direct belt driven. One Broom and Wade's air compressor for filter washing. This is driven by L. L. engine through a countershaft.
1,82,507	14,054	4·98	Reserved tank and river.	One Paterson gravity filter, size 12′×10′, capacity 7,500 gallons per hour.	Main Station— (a) Two Balckstone single cylinder spring injection cold starting crude oil engines each of 9. B. H. P., 4 stroke type, cylinder diameter 6″×12″ stroke running at 300 R. P. M. These are kept as standby. (b) Two G. E. C. "Witton" induction motor 400 volts 15 Amp. R. P. M. 1,450, 3 phase 50 cycles 10 H. P. Each working one medium and one H. L. pump through a countershaft and belts. (c) Two H. L. Gwynnes M. type single stage centrifugal pumps, capacity 7,500 gallons each per hour, against a total head of 65·6 ft. (total suction and delivery head) running at 1,500 R. P. M. (d) Two medium lift "M" type Gwynnes single stage centrifugal pumps, running at 1,100 R. P. M. River side engine— (e) Motor—One G. E. C. "Witton" induction motor 3 B. H. P. 400 volts 8 Amp. R. P. M. 1,425, 50 cycles. 3 phase direct coupled to one L. lift Worthington centrifugal pump single stage R. P. M. 1,425. Capacity 12,000 gallons per hour under a head of 33·8 ft.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population in gallons.	Total capital expenditure during 1941.
1	2	3	4	5		7	8	9
			Sq. miles.					Rs.
21	Bankura ..	1916 1st extension in 1926.	3·50	1,92,000 gallons daily.	31,703	252,717	7·97	2,649
22	Chittagong ..	1916	5·37	576,000 gallons in 16 hours. Supply varies with the condition of bore holes wheih gradually choke up due to deposit of iron salts and require cleaning up occasionally.	52,623	529,472	10·06	4,640
23	Uttarpara ..	1918	0·75	..	13,610	125,003	9·18	259
24	Nator	1919	2·50	48,000 gallons in 16 hours.	8,000	19,791	2·47	..
25	Rajbari	1919	0·76	24,000 gallons in 16 hours.	4,000	11,295	2·82	278

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
1,59,300	11,189	1·94	Rivers Gandeswari and Darkeswar.	Two infiltration galleries in the bed of river Gandheswari 2 and tube-well in the river Darkeswar.	Gandheswari Station— One Medaag Krupp vertical single cylinder two stroke diesel engine of 25 B. H. P. One Klein Schanzlin and Backer centrifugal pump, direct coupled to the engine through a gear box; capacity of pump per hour 12,000 gallons against a head of 115 feet. Darakeswar Station— One Lister vertical, twin cylinder 4 stroke, 14 B. H. P. diesel engine R. P. M. 1,000 driving a centrifugal pump of Polsometer Co., capacity 200 gallons per minute against a total head of 153 feet at 1,650 R.P.M. One Madaag Krupp vertical single cylinder two stroke diesel engine of 30 B. H. P. and one Klein Schanzlin and Backer centrifugal pump coupled through a gear box. Capacity 15,000 gallons per hour. Total head 127 feet.
4,25,593	41,945	3·47	Three bore holes	Paterson's iron elimination plant and lime and two gravity filters.	Two horizontal triple expansion surface condensing fly wheel steam engines driving direct two double acting plunger pumps for high lift and air compressor for low lift. Two Lancashire boilers. Average total lift 104′ 0″.
1,95,703	10,101	4·51	River Hooghly	One Paterson's gravity filter.	One Crompton-Parkinson, squirrel cage induction motor and two high lift Tangye's centrifugal pumps, capacity 10,000 gallons against 52 feet total head. Two Tangye's semi-diesel crude oil engines. Countershaft belt driven. Average total lift 63′ 7″.
1,18,603	4,197	9·29	Reserve tank and tube-well.	One Jewell pressure filter.	Two Petter's single cylinder two stroke vertical semi-diesel crude oil engines. Each of 6 B. H. P. Two Evan's horizontal double acting power pumps capacity of each pump per hour 3,000 gallons. Direct belt driven. Average total lift 65 feet.
66,029	2,846	11·04	Two deep seated tube-wells.	One Jewell pressure filter.	One 6 B. H. P. and one 3 B. H. P Petter's two-cycle vertical kerosine oil engines. Two "A" type double acting horizontal Worthington single power pumps, capacity 1,500 gallons per hour. Direct belt driven. Average total lift 55 feet.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average dailjy supply in gallons.	Average daily supply per head of population. in gallons.	Total capital expenditure during 1941.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
26	Satkhira ..	1919 1st extension in 1930.	3·00	24,000 gallons daily.	7,500	17,153	2·28	..
27	Noakhali ..	1920	0·75	12,120 gallons in 6 hours, can work longer.	6,050	18,958	3·13	155
28	Kalimpong ..	1922	1·50	..	8,792	190,036	21·61	..
29	Krishnagar ..	1922 1st extension in 1926.	7·50	..	32,000	380,602	11·80	1,266
30	Comilla	1925	2·58	Designed for 200,000 gallons in 16 hours (limited to 140,000 gallons per day in 24 hours until a 3rd tube well is sunk).	31,365	166,392	5·30	1,455

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs	Rs.	Annas.			
90,672	1,868	4·77	Reserve tank	One Mather and Platt's mechanical pressure filter.	Mather and Platt's turbine centrifugal pump of 4,000 gallons per hour capacity, average total lift 70·7', countershaft belt driven by two Campbell's crude oil engines of 9 B. H. P. each; one chemical pump plunger type, for pumping coagulant.
44,319	2,336	5·40	Reserved tank	No filter, chlorinating apparatus only.	One vertical boiler and one Worthington Duplex non-condensing pumping engine.
8,16,904	12,930	2·98	Springs of river Rilli.	Nil ..	Gravity supply.
4,45,056	11,336	1·30	River Jalangi	Two Jewell mechanical gravity fitters. Filtering capacity 12,000 gallons per hour each.	These ar kept as standby, one Blackstone, crude oil engine of 15 B. H. P. One Ransomes, Sims and Jefferies semi-diesel engines, 15 B. H. P. Two Ransomes, Sims and Jefferies semi-diesel engine, 10 B. H. P. each. Two Worthington 2½" high lift centrifugal pumps. Two Worthington 3" medium lift pumps and one 6" Worthington low lift centrifugal pump. All direct belt criven. Total average lift 43' 9". High lift— Two sets of Worthington split casing type centrifugal pump. Capacity 24,000 gallons against 45 feet head per hour. Direct coupled to Crompton Parkinson's 440 volts, 3 phase, 50 cycles, R. P. M. 1,440 induction motors of 10 B. H. P. each. Medium lift— Two sets of centrifugal pumps of 24,000 gallons against 26 feet head per hour. Direct coupled to induction motors of 7·5 B. H. P. and 1,430 R. P. M. River side L.L.— One centrifugal pump of 33,000 G. P. H. against 30 feet head. Capacity direct couple to induction motor of 1,450 R. P. M. and 10 B. H. P. motors and centrifugal pumps of both M. L. and L. L. are exactly like those of H. L. sets.
5,23,166	12,050	3·17	Tube-wells ..	One Paterson pressure filter.	Two 9½ B. H. P. high compression type Campbell crude oil engines, one 10 B. H. P. high compression cold starting Campbell crude oil engine. Three Worthington triplex ram pumps, direct belt driven. Average total lift 93·4 feet.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population. in gallons.	Total capital expenditure during 1941.
1	2	3	4	5	6	7	8	9
			Sq miles.					Rs.
31	Bhadreswar ..	1926	1·90	..	22,992	290,800	12·65	..
32	Midnapore ..	1926 1st extension in 1928.	4·00	350,000 gallons in 10 hours.	32,021	529,301	16·53	..
33	Raniganj ..	1927	1·85	150,000 gallons in 12 hours.	16,373	168,968	10·32	51
34	Suri ..	1927	3·15	..	10,900	86,141	7·90	264
35	Naihati ..	1928 including 1st extension.	1·68	..	42,163	287,936	6·83	498
36	Faridpur ..	1929 1st extension in 1936.	5·25	75,000 gallons per day in 8 hours.	20,000	101,711	5·08	..
37	Patuakhali ..	1929	2·00	15,500 gallons per day.	5,000	14,513	2·90	97·1

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs	Rs.	Annas.			
			From local mills and tube-wells.	....	
5,96,213	18,137	1·50	Two wells in the bed of Cossye with auxiliary tube-wells.	Nil	One 42 B. H. P. Campbell horizontal crude oil engine, one Crossley 46 B. H. P. four cycle horizontal cold starting engine, 1940, two vertical treble ram pumps. Direct belt driven. Average total lift 135′. Capacity 25,000 G. P. M.
3,41,913	12,135	3·15	Damodar river	Nil	Two Campbell high compression crude oil engines of the horizontal single cylinder ordinary cold starting type 23—26 B. H. P. each. Two Campbell vertical treble ram water pumps capacity 12,500 gallons per hour each. Direct belt driven. Average total lift 174·5′.
2,41,447	8,111	4·13	Infiltration gallery in the bed of the river Mourakhy.	Nil	Two three-throw ram pumps of 7,500 gallons capacity each direct belt driven by two 15 B. H. P. Campbell high compression horizontal heavy oil engines. Average total lift 135·7′.
2,35,512	4,482	0·68	Supplied from local mills.	....	
2,02,526	9,594	4·13	Tube-well ..	Iron elimination plant and Jewell gravity filter.	High Lift— Two A. E. G's 3 phase A. C. motors, 400-440 volts, 7·8/7·1 amps, 5·5 B. H. P. , 50 cycle R. P. M. 2,860, direct coupled with A. E. G's centrifugal pumps, capacity 8,000 gallons against a total head of 70 ft. Low Lift pumps— Two A. E. G's 3 phase A. C. motors 6·5 H. P. 400-440 volts 9·5/8·6 amps. 50 cycle R. P. M. 1,425 direct coupled to A. E. G's centrifugal pumps capacity 10,500 gallons against a total head of 50 ft. R. P. M. 1,440. Lime plant—Driven by Siemens motor 3 H. P. 400 volts, 4·8 amps. 50 cycle R. P. M. 1,420.
1,36,917	3,770	11·38	Reserved tank	One Kennicot pressure filter.	Two Evan's power pumps. Two 3 B. H. P. Petter's vertical kerosine oil engines. Direct belt driven. Pumping capacity of the pump is 300 gallons per hour. Average total lift 46′. Kept as standby. Ercole Manille and C. S. A. Milanee Motor one is 440 volts, A 6·95, 4 H. P. motor 2,800 R. P. M. and the other is 440 volts, 4·8 amp, 2·2 H. P. motor made in Italy. Pumps are direct coupled single stage 1¼″ centrifugal pumps capacity 53·3/31·6 gallons per minute against total head of 53/75 ft. R. P. M. 2,850 mounted on common bed plate.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population. in gallons.	Total capital expenditure during 1941.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
38	Asansol ..	1930	4·04	264,000 gallons in 12 hours.	48,015	300,000	6·25	296
39	Nabadwip ..	1931	1·50	..	18,861	33,373	1·77	1,873
40	Bansberia ..	1931	3·10	..	9,000	128,488	14·27	..
41	English Bazar ..	1932	1·50	112,000 gallons per day in 8 hours (can run 16 hours).	11,000	88,085	8·00	325
42	Bhatpara ..	1932	5·00	..	117,000	1,057,957	9·04	25,484
43	Narainganj (East Bank)	1932	1·50	161,000 gallons in 12½ hours (capacity limited by elevated storage tank).	9,700	105,820	10·90	722
44	Chandpur (Northern Section).	1932	0·36	140,000 gallons per day in 14 hours (capacity limited by storage in elevated tank).	7,750	73,434	9·47	..
45	Jalpaiguri ..	1934 1st extension in 1936.	3·06	112,000 gallons per day in 8 hours (can run 16 hours).	24,550	113,313	4·66	435

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
5,00,688	20,517	2·99	Infiltration gallery in the bed of the river Damodar with an auxiliary tube-wells.	Nil	Two General Electric "Witton frame" enclosed ventilated type slip ring induction electric motors of 49 B. H. P. each, 400 volts A. C., direct coupled with two Sulzer high lift centrifugal pumps. Capacity 22,000 gallons per hour each. Average total lift 270′.
52,349	2,003	2·63	Two tube-wells	....	
1,03,475	4,850	1·65	Supplied from local mills.	....	
1,04,116	6,005	2·99	Two tube-wells	....	Two 24 B. H. P. Crossley four cycle horizontal cold starting crude oil engines. Two high lift Worthington centrifugal split casing pumps, capacity 14,000 gallons per hour against a total head of 110 feet. Two Worthington horizontal double acting air compressors, size 7½″×6″ stroke, for air lift from the tube-wells. All direct belt driven.
2,86,497	..	..	Local mills (tube-wells and the river Hooghly).	....	
2,23,799	6,480	2·68	Tube-wells ..	Iron and manganese elimination plant and one Paterson filter.	Two Ruston and Hornby cold starting semi-diesel 4 cycle-horizontal type crude oil engines rated 22 B. H. P. Three Harland low lift. centrifugal pumps, capacity 6,500 gallons per hour against 60 feet total head. Two Harland high lift centrifugal pumps, capacity 13,000 gallons per hour against total head 78 feet. All belt driven through a countershaft.
1,88,358	6,077	3·62	River Dakatia	Two Jewell gravity filters.	Two 24 B. H. P. Crossley horizontal 4 cycle cold starting crude oil engines. Four Mather and Platt split casing type centrifugal pumps for low lift capacity 10,000 gallons per hour against a total head of 31 feet. Two Mather and Platt centrifugal pumps for high lift capacity 10,000 gallons per hour against a head of 49 feet. All belt driven through a countershaft.
1,12,453	9,774	3·78	Two 5″ diameter tube-wells.	Two upward flow gravel filters.	Two sets of centrifugal pumps direct coupled to 440 volts A. C. induction motors. Capacity of each pump 7,500 gallons per hour against 104 feet head. These sets pump water from tube-wells to iron eliminating plant. One set centrifugal pump same as above used as high lift and also two sets of centrifugal pumps direct coupled to 440 volts A. C. 14¾ B. H. P. induction motor capacity of each pump 14,000 gallons per hour, head 90 feet.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population. in gallons.	Total capital expenditure during 1941.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
46	Kalna ..	..	0·85	..	6,000	47,740	7·95	4,179
47	Serampore ..	1936	1·62	512,000 gallons in 16 hours.	39,056	570,945	14·61	25,203
48	Rangamati ..	1936	0·12	14,000 gallons per day in 14 hours (capacity limited by storage in street tanks).	2,000	16,409	8·20	..
49	Bagerhat ..	1937	3·00	..	3,500	21,257	6·07	..
50	Rajshahi ..	1937 including 1st extension.	1·25	..	18,000	90,715	5·04	20,136

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
37,632	2,429	2·23	One 5″ diameter and one 4″ diameter tube-wells.	....	....
6,56,856	20,800	1·60	River Hooghly	Three Paterson's rapid gravity type filters capacity 34,000 gallons each complete with air wash plant and chloronome.	Unfiltered station— (*i*) Three 5″ Gywnnes centrifugal "KL" pumps for low lift direct coupled to "Asea" 12 H. P., 400 volts 3 phase 50 cycle induction motors running at 1,440 R. P. M. Each set capable of de.ivering 33,500 gallons of water per hour against a total head of 47 ft. Filtered station— (*ii*) Three 5″ Gwynnes centrifugal "K" pumps for high lift direct coupled to three "Asea" 30 H. P., 400 volts 3 phase 50 cycle induction motors, running at 1, 440 R. P. M. Each set capable of delivering 34,000 gallons of water per hour against a total gauge head of 124 ft. Transformer—(*iii*) One "Asea" 3 phase, oil immersed, self-cooled Core type transformer, rated 100 K. V. A. at 50 cycles and designed for a voltage ratio of 6,000/400 volts at full load.
42,339	5,605	14·97	River Karnafuly	One 42″ diameter ×4″ 6″ steel jewell pressure filter, capacity 1,000 gallons per hour.	Two Deutz full diesel 10 B. H. P. horizontal engines direct coupled to Siemens-Schuckert Generators of 5 K. W. and 230 volts. One Siemens-Schuckert 2 B. H. P. motor direct coupled to Amagh-Hilpert, 4 stage centrifugal pumps, capacity 1,000 gallons per hour. Head 120 feet. Speed 1,410 R. P. M.
56,681	3,779	7·79	Two 5″ diameter tube-wells.	One iron elimination plant, capacity 5,000 gallons per hour and one water softening plant of the same capacity.	Two Petters 10 B. H. P. 800 R. P. M. crude oil engines. High Lift— Two Mather and Platt 3″/3″ medivane split casing centrifugal pumps, capacity 4,000 gallons per hour against 55 feet head from all causes, R. P. M. 1,100. Low Lift— Two Mather and Platt 2″/3″ medvane split casing centrifugal pumps, capacity 2,500 gallons per hour against a total head of 45 feet, R. P. M. 1,050.
1,39,315	12,873	6·22	Two tube-wells	Two water softening plants—capacity 8,000 gallons per hour each. 2 more jewell filters.	High Lift— Two 4″/3″ Worthington centrifugal pumps direct coupled to 10 B. H. P. 460 volts D. C. motor, R. P. M. 1,440, capacity 11,000 gallons per hour each against a total head of 80 feet. One Crompton Parkinson motor and Worthington 6+2=8 stages pump. Low Lift— Two vertical spindle deep well turbine 7″ pumps direct coupled to 10 B. P. H. 460 volts vertical spindle D. C. motor. R. P. M. 1,750. Capacity 11,000 gallons per hour each against a total head of 55 feet. Supply taken from Noakhali municipal pumping plant.

No.	Name of municipality.	Year of completion.	Area served.	Designed capacity of works.	Approximate population served.	Average daily supply in gallons.	Average daily supply per head of population in gallons.	Total capital expenditure during 1941.
1	2	3	4	5	6	7	8	9
			Sq. miles.					Rs.
51	Matjdi ..	1937	0·17	1,250 gallons per hour for 8 hours.	600	6,073	10·12	−2
52	Baranagar-Kamarhati	1939	8·05	..	91,000	536,323	5·89	2,490
53	Garden Reach (in progress).	..	..	..	..	..	..	17,695
	Total ..	..	..	..	1,639,206	19,514,444	..	3,45,959

Total capital expenditure up to 1941.	Annual cost of maintenance (exclusive of loan charges).	Cost of delivery of 1,000 gallons (exclusive of loan charges).	Source of supply.	Type of filters employed.	Type of engines and pumps.
10	11	12	13	14	15
Rs.	Rs.	Annas.			
25,993	1,714	12·37	Reserved tank	One 48″ diameter jewell pressure filter, capacity 1,250 gallons per hour.	Two Lister single cylinder 6 B. H. P. vertical 4 cycle crude oil engines. R. P. M. 600. Two 2″/1½″ Worthington uniflow split casing centrifugal pumps. Capacity of each 1,250 gallons per hour against a total head of 60 feet at 1,400 R. P. M.
7,43,100	24,378	1·99	River Hooghly	3 Nos., Paterson gravity filters size—13′ × 25′ capacity 22,250 gallons per hour each.	River side station.— One Pulsometer vertical spindle Axial flow propeller pump output 120,000 G. P. H. against total head of 12 ft. direct coupled to vertical spindle squirrel cage 3-phase 50 cycle, 400 volts, 13 H. P. A. C. motor. Low Lift pumping sets.— 3 Nos. Pulsometer type horizontal single stage 6″ centrifugal pump. Each capable of pumping 33,500 G. P. M. against total head of 41 ft. direct coupled to squirrel cage 3-phase, 50 cycles, 400 volts, 11 H. P. A. C. motors. High Lift station.— 3 Nos. Pulsometer type horizontal single stage 5″ centrifugal pumps capacity 33,500 G. P. H. each against total head of 90 ft. direct coupled to squirrel cage 3-phase, 50 cycles, 400 volts, 25 H. P. A. C. motors. Transformer.— One double wound core, oil immersed self-cooled transformer capacity 100 KVA when operating on 3-phase 50 cycle supply and having a voltage ratio of 6,000/400 volts.
2,62,206	..	..	..	..	
[illegible]195	..	..	..	..	

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APPENDIX II.

Total expenditure on drainage and sewerage works in the municipalities in Bengal up to 31st December 1941.

No.	Name of municipality.	Area served.	Approximate population served.	Total capital expenditure during the year 1941.	Total capital cost up to 31st December 1941.	Annual cost of maintenance.
1	2	3	4	5	6	7
		Sq. mile.		Rs.	Rs.	Rs.
1	Asansol ..	..	..	6,403	1,34,154	1,426
2	Bagerhat ..	..	..	6,985	7,242	..
3	Bankura ..	0·08	7,500	229	15,307	3,749
4	Baranagar ..	2·12	39,000	3,759	1,01,792	4,172
5	Barasat ..	3·50	5,500	..	24,809	270
6	Baruipur ..	3·50	6,483	..	17,368	298
7	Basirhat ..	8·50	26,348	921	25,599	921
8	Berhampore ..	6·00	40,804	1,548	70,779	8,349
9	Bhadreswar ..	0·65	16,200	663	35,405	1,961
10	Bhatpara ..	5·00	117,000	7,807	17,43,585	27,132
11	Budge Budge ..	2·00	5,612	1,621	1,01,977	1,883
12	Burdwan ..	4·00	28,000	1,144	1,99,080	458
13	Champdani ..	2·00	20,000	..	2,66,048	3,240
14	Chandpur (South) ..	0·05	3,300	..	1,993	1,195
15	Chandpur (North) ..	0·05	1,430	..	713	96
16	Dacca ..	4·00	1,10,000	3,215	26,14,541	22,171
17	Darjeeling ..	4·85	23,000	..	2,14,970	3,930
18	English Bazar ..	2·00	11,000	379	36,110	638
19	Garulia ..	1·50	14,000	3,745	58,800	2,017
20	Howrah ..	4·04	141,416	25,703	15,92,126	51,608
21	Jangipur ..	3·00	12,000	..	47,332	91
22	Kalimpong and Bazar ..	..	..	..	64,013	..
23	Katwa ..	1·00	7,886	..	57,608	1,598
24	Khulna ..	3·00	16,000	645	33,117	3,151
25	Krishnagar ..	1·50	12,000	685	45,288	1,522
26	Kurseong ..	2·00	6,000	..	2,56,482	1,478
27	Kushtia ..	0·55	5,000	520	38,933	1,630
28	Maijidi ..	..	..	956	33,654	1,058
29	Narainganj (West Bank)	3·00	24,000	870	10,567	3,403
30	Narainganj (East Bank)	1·50	10,000	..	554	264
31	Patuakhali ..	2·00	5,000	..	..	498
32	Ranaghat ..	2·00	11,395	771	57,270	2,385
33	Rangpur ..	2·00	7,000	169	93,283	4,211
34	Rajshahi ..	1·25	15,000	514	3,044	2,681
35	Satkhira ..	0·25	2,000	48	139	10
36	Serampore ..	0·20	10,000	8,416	60,896	..
37	Suri ..	2·00	7,500	524	51,532	1,982
38	Tangail ..	0·19	3,000	482	25,250	482
39	Tittagarh ..	1·50	57,233	1,117	13,04,498	38,406
40	Uttarpara (in progress)	0·75	13,610	1,337	46,848	1,702
	Total ..		8,41,217	81,176	94,92,706	..

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